

## THE ACCURACY OF PREDICTING PELVIC ORGAN PROLAPSE QUANTIFICATION (POPQ) POINTS USING TRANSPERINEAL ULTRASOUND IN WOMEN WITH PELVIC ORGAN PROLAPSE (POP)

### Hypothesis

The prediction of POP using transperineal ultrasonography measurements is as accurate as POPQ.

### Aims of study

To determine the relationship between clinical assessment of POP using the validated POPQ and dynamic 2D transperineal ultrasound imaging.

### Study design, materials and methods

We recruited 160 women attending the urogynaecology and gynaecology clinics between July to October 2009. 106 women had incontinence and/or prolapse and 54 asymptomatic women were taken as controls. All patients had a clinical examination (POP-Q) by an independent examiner. The measurements of POP-Q points Ba, C, and Bp were used in this study to describe maximum descent of the anterior, middle and posterior compartment respectively.

Transperineal ultrasound was performed by another clinician who was not aware of the POPQ findings. Transperineal ultrasound (6 MHz convex transducer, Type 8802, ProFocus Ultraview, B-K Medical) was performed at rest and maximum valsalva with the patient placed in the dorsal position [1]. As the transperineal scan probe compresses the prolapse that extends beyond the hymen, these subjects were excluded from analysis. The measurements of prolapse were taken offline on the image demonstrating maximum descent. A reference line was drawn parallel to the infero-posterior margin of pubic symphysis perpendicular to which the leading edge of descent was measured at maximum possible valsalva on three consecutive occasions.

The offset was measured from the curved array of the probe to the reference line. This off set measurement was added to the prolapse quantification on ultrasound scan to make it objectively comparable to the POPQ reference of the hymen. Points Ba, Bp and C on POPQ [2] were then compared to points of maximum descent achieved on ultrasound during maximum valsalva.

### Results

158 of 160 women had a POPQ and transperineal ultrasound assessment. Twenty scans (12.6%) were not analyzable and 43 women who had POP beyond the hymen were excluded. 97 women were included for analysis (51 women with prolapse with or without incontinence and 46 controls). Fifty women with POP had prolapse of more than one compartment (48 women had anterior compartment prolapse, 45 posterior and 49 had middle compartment prolapse). The mean age was 49.5 years (SD  $\pm$  14.1), BMI 29.3 kg/m<sup>2</sup> (SD  $\pm$  6.5) and median parity of 2 (range 0-6). 15.5% had previously undergone hysterectomy, 10.3% prolapse surgery and 16.5% had incontinence surgery.

Table 1 shows the correlation between 2D ultrasound imaging (with/ without the addition of the offset) and POPQ assessment. They are all statistically significant (p-value <0.0001) and strongest for bowel and bladder. Table 2 shows the weighted kappa statistic and the proportion of correct predictions, when ordinal logistic regression analysis, with the ultrasound measurement and the offset as covariates, is used to predict the POPQ assessment. The results were derived using cross validation where each subject's POPQ was estimated in turn, using a regression model with parameters estimated from the data for the other subjects. The proportion of correct predictions were 59.6%, 61.5% and 32.6% for bladder, bowel and middle compartment prolapse respectively.

### Interpretation of results

Ultrasonography is increasingly being used in the diagnostic evaluation of POP. A correlation between pelvic organ descent on clinical examination and ultrasound scan has been demonstrated [3]. Uterovaginal prolapse is frequently multicompartment and therefore can pose a diagnostic challenge to the reconstructive surgeon. We are not aware of any published studies that have assessed the accuracy of predicting prolapse using transperineal ultrasonography measurements. We found good correlations in all three pelvic floor compartments between the POPQ points (Ba, Bp, C) and transperineal ultrasound (p-value <0.0001). However, it was only possible to correctly predict anterior and posterior wall prolapse in approximately 60% and middle compartment prolapse in 33% of women with prolapse. Pelvic floor reconstructive surgeons need to be aware of the limitation of ultrasonography.

### Concluding message

Clinical assessment remains the gold standard and the accuracy of pelvic floor ultrasound in predicting POPQ staging is limited.

Table 1: Pearson's correlation between ultrasound measurements and POPQ points Ba, Bp and C/D for anterior, posterior and middle compartments respectively.

Compartment	Pearson correlation coefficients		p value
	Raw data	Data with offset	
Anterior	0.693	0.655	< 0.0001
Posterior	0.673	0.719	< 0.0001
Middle	0.600	0.552	< 0.0001

Table 2: Table demonstrating Weighted Kappa / Concordance to demonstrate prediction of POPQ points from ultrasound measurements.

	Weighted Kappa	Concordance
Bladder (n=48)	0.5646	59.6%
Bowel (n=45)	0.5543	61.5%
Cervix (n=49)	0.3350	32.6%

#### References

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<b><i>What were the subjects in the study?</i></b>	<b>HUMAN</b>
<b><i>Was this study approved by an ethics committee?</i></b>	<b>Yes</b>
<b><i>Specify Name of Ethics Committee</i></b>	<b>National Research Ethics Service Bromley Local Research Ethics Committee</b>
<b><i>Was the Declaration of Helsinki followed?</i></b>	<b>Yes</b>
<b><i>Was informed consent obtained from the patients?</i></b>	<b>Yes</b>